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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,904	03/08/2001	Byung-hee Kim	SEC.467D	8021

7590 04/24/2002

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EXAMINER

ESTRADA, MICHELLE

ART UNIT PAPER NUMBER

2823

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/800,904

Applicant(s)

KIM ET AL.

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 13-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/198,374.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

OK  
Claims 13-20 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for making the amount of Pb the same at the top and the bottom, does not reasonably provide enablement for making the characteristics of the lower face and the upper face of the ferroelectric layer be the same. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. The exemplification of making the amount of Pb the same at the top and bottom interfaces does not provide sufficient guidance to one of ordinary skill in the art to make "characteristics" of the interfaces "the same" broadly without undue experimentation.

Chemical reactivity is a most unpredictable and empirical art and it is well settled that the requirement that the claims be commensurate in scope with the enabling disclosure is particularly stringent in this area of technology. In re Doumani 126 USPQ 408, In re Grant 134 USPQ 248, In re Fisher 166 USPQ 18, Mobil Oil Corporation v. W. R. Grace and Company 180 USPQ 418, In re Slocombe 184 USPQ 740, In re Mercier 185 USPQ 774, Corona Cord Tire Company v. Dovan Chemical Corporation 192 CD

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255, See In re Hawkins 174 USPQ 157 (pg. 163) reasoning is sufficient, evidence is not required.

OK The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 13, line 7, it appears that "a structure resulting from a)-d)" should be replaced with --the resultant structure--.

In claim 13, line 8, it appears that "a" before "lower" should be replace with --the--

In claim 13, line 8, it appears that "an" before "upper" should be replace with --the--.

The term "be the same" in claim 13 is a relative term which renders the claim indefinite. The term "be the same" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends any particular characteristic of the ferroelectric layer, it must be clearly recited.

In claim 13, line 9, it is questioned what is recited through use of "stable".

The term "similar" in claim 16 is a relative term which renders the claim indefinite. The term "similar" is not defined by the claim, the specification does not provide a

standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends any particular lattice constant of the ferroelectric layer, it must be clearly recited.

In claim 19, line 1, it appears that "the" before "forming" should be deleted.

In claim 20, line 2, it appears that --step-- should be inserted after "electrode".

In claim 20, line 5, it appears that --step-- should be inserted after "electrode".

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 13-18 are rejected under 35 U.S.C. 102(a) as being anticipated by Anderson et al. (5,978,207).

Anderson et al. disclose forming a lower electrode (19); forming a lower seed layer (21) on the lower electrode; forming a ferroelectric layer (25) on the lower seed layer; forming an upper seed layer (27) on the ferroelectric layer; annealing the structure including making characteristics of a lower face and an upper face of the ferroelectric layer be the same and completing a stable perovskite crystal structure of the ferroelectric layer; and forming an upper electrode (30) on the upper seed layer; wherein forming a ferroelectric layer comprises forming a PZT ferroelectric layer (Col. 7,

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lines 57-63) on the lower seed layer; wherein the forming the upper and lower seed layers includes using a material having a crystallization temperature lower than that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using a ferroelectric material having a lattice constant similar to that of a material for forming the ferroelectric layer; wherein the forming the upper and lower seed layers includes using  $\text{PbTiO}_3$  having at least one of a higher Pb content and a higher Ti composition ratio than a PZT to be used to form the ferroelectric 44 layer (See claim 5); wherein the forming the lower electrode and the upper electrode includes using a Pt-group metal layer or a conductive oxide layer (See claim 7).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19-20 rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. as applied to claims 13-18 above, and further in view of Hsu et al. (6,048,738).

Anderson et al. do not disclose further comprising, prior to forming the lower electrode, forming a switching element to be electrically connected to the lower electrode; and further comprising before forming the lower electrode providing a

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semiconductor substrate; and forming a gate insulating layer on the semiconductor substrate, and after the forming the upper electrode forming source and drain regions in a portion of the semiconductor substrate adjacent to a periphery of the gate insulating layer.

Hsu et al. disclose providing a semiconductor substrate; and forming a gate insulating layer (72) on the semiconductor substrate, forming a polysilicon layer (74); forming a lower electrode (76); forming a ferroelectric layer (78); forming an upper electrode (80) and after the forming the upper electrode forming source and drain regions in a portion of the semiconductor substrate adjacent to a periphery of the gate insulating layer (Col. 5, lines 24-32); and forming a switching element to be electrically connected to the lower electrode (See fig. 9).


It would have been within the scope of one of ordinary skill in the art to combine the teachings of Anderson et al. and Hsu et al. to enable formation of the ferroelectric structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 703-308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431 and 3432) for regular communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



George Fourson  
Primary Examiner  
Art Unit 2823



MEstrada  
April 22, 2002